

**REMARKS**

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-2, 4-12 and 17-20 are presently active in this case. The present Amendment amends Claim 1 and 4; cancels Claims 3 and 13-16 and adds new Claims 17-20.

In the outstanding Office Action Claims 1, 5, 6, 8, 10 and 11 were rejected under 35 U.S.C. §102(b) as anticipated by Gonzalez et al. (U.S. Patent No. 6,194,327, herein referred as to “Gonzalez”). Claim 3 was rejected under 35 U.S.C. §103(a) as unpatentable over Pai et al. (U.S. Patent No. 6,764,967, herein referred as to “Pai”). Claims 3 and 4 were rejected under 35 U.S.C. §103(a) as unpatentable over Pai in view of Herbots et al. (U.S. Patent No. 6,613,677, herein referred as to “Herbots”).

First, Applicants wish to thank the Examiners Maldonado and Fourson for the courtesy of an interview granted to Applicants’ representative on February 23, 2005, at which time the outstanding issues in this case were discussed. Arguments similar to the ones developed hereinafter were presented and the Examiners indicated that in light of the arguments they would reconsider the outstanding grounds for rejection upon formal submission of a response.

In response to the Restriction Requirement being made final, Claims 13-16, directed to non-elected inventions, are canceled. Applicants reserve the right to present claims directed to the non-elected inventions in a divisional application, which shall be subject to the third sentence of 35 U.S.C. § 121.<sup>1</sup>

In response to the rejections of Claims 1, 5, 6, 8, 10 and 11 under 35 U.S.C. §102(b) in view of Gonzalez and Claims 1, 2, 5-7, 9 and 12 under 35 U.S.C. §102(e) in view of Pai and additionally in order to clarify Applicants’ invention, independent Claim 1 is amended to

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<sup>1</sup> “A patent issuing on an application with respect to which a requirement for restriction under this section has been made ... shall not be used as a reference ... against a divisional application.” See also MPEP 804.01.

additionally recite all the features of original Claim 3. Consequently Claim 3 is cancelled and Claim 4 is amended to be dependent upon independent Claim 1.

In order to vary the scope of protection recited in the claims, new Claims 17-20 are added. New Claim 17 recites that “said monitoring includes the imaging of a surface of the substrate after removal of one of said ultra-thin oxide layers.”<sup>2</sup> New Claim 18 recites that “said monitoring includes the imaging of a silicon lattice at a surface of the substrate after removal of one of said ultra-thin oxide layers.”<sup>3</sup> New Claims 19 and 20 recite that “said imaging comprises using high-resolution transmission electron microscopy (HRTEM) data,” and depend upon Claims 17 and 18, respectively.<sup>4</sup> Since the claims find support in the disclosure as originally filed, these changes are not believed to raise any question on new matter.

In response to the rejection of Claims 3-4 under 35 U.S.C. §103(a), Applicants respectfully request reconsideration of this rejection and traverse the rejection, as discussed next.

Briefly recapitulating, Applicants’ amended Claim 1 relates to a method of processing a substrate including the growing and etching an ultra-thin oxide layer on a surface of the substrate to consume defects in a surface region of the substrate; monitoring the surface region of the substrate; and repeatedly growing an addition ultra-thin oxide layer and etching the additional oxide layer to remove the consumed additional defects based on the monitoring of the surface region.

As explained in Applicants’ specification at page 1, paragraph 4-6, Applicants’ invention improves upon conventional methods of processing substrates because surface

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<sup>2</sup> This change is supported by Applicants’ Specification at page 11, paragraph 47.

<sup>3</sup> This change is supported by Applicants’ Specification at page 11, paragraph 47.

<sup>4</sup> This change is supported by original Claim 4.

properties can be improved, and substrates with an increased nucleating surface can be fabricated. The claimed invention thus leads to improved surface regions on substrates.<sup>5</sup>

Turning now to the applied references, the Pai patent discloses a CMOS device fabrication process and a method of fabricating sacrificial oxide layers to avoid undesired thermally induced diffusion.<sup>6</sup> Pai, however, fails to teach or suggest Applicants' claimed monitoring the surface region of the substrate; and repeatedly growing an addition ultra-thin oxide layer and etching the additional oxide layer based on the monitoring of the surface region. In particular, and as acknowledged by the outstanding Office Action,<sup>7</sup> Pai fails to teach or suggest the claimed monitoring the surface region of the substrate.

Additionally, the Gonzalez patent does not teach anything on the monitoring of the surface region of the substrate. Gonzalez discloses that a native oxide film present on the substrate before the processing can first be etched (B in Fig. 1) before growing a sacrificial oxide (B<sub>1</sub> in Fig. 1).<sup>8</sup> A dashed arrow shows that the sacrificial oxide and etch steps can be repeated. However, there is no discussion in Gonzalez of monitoring the surface region of the substrate and repeatedly growing the ultra-thin oxide layers based on that monitoring. Because there is no monitoring in Gonzalez, the repeated oxide growth and etch steps cannot be controlled based on the actual condition of the surface region or with the claimed invention. Accordingly, it cannot be inferred from Gonzalez that a monitoring of the surface region is required.

The outstanding Office Action rejects Applicants' Claims 3 and 4 based on the proposition that the Herbots patent discloses the above monitoring feature,<sup>9</sup> and that it would have been obvious to modify Pai by importing this feature from Herbots to arrive at Applicants' claimed invention. Applicants respectfully submit, however, that Herbots fails to

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<sup>5</sup> See Applicants' Specification at page 1, paragraph 1.

<sup>6</sup> See Pai at column 1, lines 5-13.

<sup>7</sup> See outstanding Office Action at page 5, lines 3-4.

<sup>8</sup> See Gonzalez at column 4, lines 15-30.

<sup>9</sup> See outstanding Office Action at page 5, lines 4-7.

disclose the above feature related to monitoring the surface region of the substrate; and repeatedly growing an additional ultra-thin oxide layer and etching the additional oxide layer based on the monitoring of the surface region, as next discussed.

The outstanding Office Action relies on Herbots's text at column 19, lines 15-32. This passage of Herbots recites that "the *oxide geometric thickness* as measured by high resolution transmission electron microscopy (HRTEM) is 1.8nm."<sup>10</sup> Reading Herbots, a person of ordinary skill in the art would understand that *oxide geometric thickness* measured by high resolution transmission electron microscopy (HRTEM), as disclosed by Herbots, is not monitoring the surface region of the substrate. As explained in Herbots, the thickness of the oxide layer is measured for verification purposes and is not part of a monitoring of a surface region in a sacrificial oxide growth process. Accordingly, measuring the geometrical thickness in Herbots *is not* the monitoring of the surface region of the substrate so that growth of a sacrificial oxide layer can be repeated based on such monitoring, as would be required to meet Applicants' claimed feature.

Therefore, even if the combination of the Pai, Herbots and Gonzalez references is assumed to be proper, the combination fails to teach every element of the claimed invention. Accordingly, Applicants respectfully traverse, and request reconsideration of, this rejection based on these patents.<sup>11</sup>

In response to the rejection of Claim 2 under 35 U.S.C. §103(a), since Claim 2 now depends upon amended Claim 1, that is believed to be patentably distinct over the applied references, the rejection is believed to be overcome.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in

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<sup>10</sup> See Herbots at column 19, lines 21-23 (emphasis added).

<sup>11</sup> See MPEP 2142 stating, as one of the three "basic criteria [that] must be met" in order to establish a *prima facie* case of obviousness, that "the prior art reference (or references when combined) must teach or suggest all the claim limitations," (emphasis added). See also MPEP 2143.03: "All words in a claim must be considered in judging the patentability of that claim against the prior art."

condition for formal Allowance. A Notice of Allowance for Claims 1-2, 4-12 and 17-20 is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact Applicant's undersigned representative at the below listed telephone number.

Respectfully submitted,

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